【0030】

Embodiments

The present invention will be explained by referring diagrams.

【0031】

In Fig. 1, a configuration of a transmitter of a digital signal transmitting device according to Embodiment 1 of the invention is illustrated.

【0032】

In this Embodiment 1, for example, a case in which MPEG2 signals are transmitted by an IEEE1394 transmitting device is assumed.

【0033】

In Fig. 1, "1" is a transmitter, "2" is a counter, "3" is a buffer, "4" is an arrival timing acquisition unit, "5" is a time stamp generator, "6" is a transmission band decider, "7" is a time stamp providing unit, "8" is a transmission timing decider, "9" is a cycle time register (CTR), and "10" is a transmission packet converter.

【0034】

Moreover, Fig. 5 is a diagram illustrating a configuration of the transmission timing decider 8. In Fig. 5, "50" is an output time judging unit, "51" is a counter, and "52" is a transmission timing controller.

【0035】

A transmission time stamp is generated based on the count value in

the cycle time register (CTR) 9 as a timer, by which a time is synchronized among devices connected to a transmission line.

【0036】

When each of MPEG2 data packets is outputted to the transmitter 1, the arrival timing is acquired by the arrival timing acquisition unit 4.

【0037】

The time stamp generator 5 latches the count value in the CTR 9 based on the arrival timing, and further adds the count value of the maximum delay time between the predefined transmitter and the receiver, so as to generate a transmission time stamp.

【0038】

After the inputted data packets are stored into the buffer, the transmission time stamp is provided to each of the data packets by the time stamp providing unit 7, and the data packets are converted into source packets. Moreover, the transmission packet converter 10 converts the source packets into a transmission packet, in which multiple source packets are integrated, and the transmission packet is transmitted.

【0039】

At the time, the transmission timing decider 8 controls the transmission timing on which the transmission packet is actually transmitted from the transmission packet converter 10 to the transmission line.

【0040】

Firstly, the output time judging unit 50 inputs the time stamp

values, in which output time of each of the data packets in the receiver is respectively stored, from the time stamp generator 5, and records the time stamp value. Next, the output time judging unit 50 compares the each of the time stamp values with the actual value of the CTR, and judges whether the each of data packets is already outputted or not from the receiver.

【0041】

Because the value of the CTR is synchronized in all connected nodes, the value of the CTR in the receiver is equivalent to the value of the CTR in the transmitter. Therefore, the above judgment is available by comparing the time stamp value with the value of the CTR.

【0042】

When the output time judging unit 50 judges that the each of the data packets is already outputted, the counter 51 decreases the count value one by one in accordance with the each of the data packets. And, when the each of the data packets is transmitted from the transmission packet converter 10, the counter 51 increases the count value one by one.

【0043】

Therefore, the count value is equal to the number of the data packets in the current buffer of the receiver. The transmission timing controller 52 outputs a signal, based on the count value of the counter 51, for controlling the output timing from the transmission packet converter 10. In other words, when the count value is increased and may exceed the predefined value that is calculated by dividing the

buffer size by the data packet size, the transmission timing from the transmission packet converter 10 to the transmission line is delayed. Moreover, when the count value approaches zero, the transmission timing from the transmission packet converter 10 to the transmission line is hastened. The controller 52 can be composed of a micro computer, software and the like, based on the above logic.

【0044】

The transmission timing decider 8 can control the transmission timing on the transmitter side by executing the above operations, so as to prevent an overflow and an underflow of the buffer on the receiver side.

【0045】

Moreover, the transmission timing is controlled, so that the count value may reach the maximum value within a range in which the count value does not exceed the predefined value. Because transmission timing is controlled as described above, the number of the data packets in the buffer on the receiver side reaches the maximum value within a range in which the number of the data packets does not overflow. Therefore, when the transmission packet is not transmitted to the receiver side during a predefined period by an occurrence of a failure in the transmitter or the transmission line, the output of the receiver side can be continued as much as possible.

【0046】

The counter 2 sequentially calculates a bit count of the number of data packets inputted into the transmitter during a predefined

period, for example, a multiple of 24.576 MHz which is the clock frequency of the IEEE1394 transmitting device. Because the size of the data packet is fixed to 188 byte in the MPEG2 transmission, the average rate can be relatively obtained.

【0047】

The transmission band decider 6 can obtain the average rate during the predefined period, in accordance with the count value of the counter 2.

【0048】

One of transmission bands, in which the average rate can be transmitted, is selected from a plurality of transmission bands according to the transmitter. When the transmission band decider 6 decides the transmission band, the decider 6 considers a predefined rate, which is slightly higher (for example, 1.2 times higher) than the obtained average rate, and selects the narrowest transmission band as far as the fluctuation, based on the variation of the data arrival timing in the real system, can be absorbed.

【0049】

In order to establish the selected transmission band, the transmission packet including band-establishment-demand information is transmitted to the transmission line.

【0050】

By the operations as described above, the data rate can be directly obtained without analyzing the data in the MPEG2 signal, and the transmission band can be easily decided by using the data rate.